

clarification regarding Applicants prior change to page 42, line 12 of the specification. Specifically, the Examiner requested clarification or verification on the change of "08/876666" to --04/976,666--. Applicants have herein amended the specification on page 42, line 12 by changing "04/976,666" to --08/976,666--.

In the October 23, 2000 Office Action, the Examiner has rejected claims 29-35 and 54-56 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner has noted that while amending claim 29 to independent form, Applicants deleted the spatial relationship between the two electrode layers and the four photoconductive organic layers. As suggested by the Examiner, independent claim 29 has been amended to reinstate this spatial relationship. In view of this amendment, it is respectfully submitted that these claims are definite and the Examiner's rejection under 35 U.S.C. § 112, second paragraph, should be withdrawn.

In rejecting claims 31 and 35, the Examiner noted that these claims would be otherwise allowable if rewritten to overcome the aforementioned rejection under 35 U.S.C. § 112, second paragraph, and also to include all of the limitations of the rejected base claim and any intervening claims. Applicants have herein amended these claims in order to include all of the limitations of the rejected base claim and any intervening claims. Therefore, it is respectfully submitted that claims 31 and 35 are currently in proper form, and the Examiner's rejection of these claims should be withdrawn.

The Examiner has also rejected claims 29, 30, 32-34 and 54-63 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,350,459 ("Suzuki et al.") in view of U.S. Patent No. 5,331,183 ("Sariciftci et al."). According to the Examiner, "[i]t would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to use a conductive metal oxide such as indium/tin oxide or a conducting polymer such as polyaniline to make a photovoltaic device according to Suzuki et al. having two transparent electrodes." The Examiner further alleged that "[o]ne of ordinary skill in the art would have been motivated to do so by Sariciftci's disclosure of conductive polymers and conductive metal oxides as equivalents of metal in the manufacture of electrodes for a

photovoltaic device, and by Sariciftci's disclosure of conductive polymers such as polyaniline and conductive metal oxides such as indium tin oxide as equivalents in the manufacture of transparent electrodes for a photovoltaic device." The Examiner's position is respectfully traversed and withdrawal of this rejection is believed to be warranted for at least the following reasons.

Applicants respectfully submit that the Examiner is improperly using hindsight reasoning in reaching her conclusion of obviousness. Each of the rejected claims 29, 30, 32-34 and 54-63 contain the limitation of two transparent electrode layers. In describing Suzuki et al., the Examiner stated that Suzuki et al. did not require two transparent electrodes, but that this was suggested by Suzuki et al.'s "at least one" phrase used with respect to the transparent electrode. From this, the Examiner concluded that "[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to make the organic photovoltaic element of Suzuki et al. with two transparent electrodes so as to attain the advantages provided by having two transparent electrodes such as being able to expose the photoconductive layers to electromagnetic radiation through either electrode." However, the Examiner has not pointed to any prior art teaching or suggestion regarding the desirability of employing *two* transparent electrodes in an organic photosensitive optoelectronic device, and neither Suzuki et al. nor Sariciftci et al. teach such a desirability. In fact, only in the Applicants specification can such motivation be found for employing two transparent electrodes in an organic photosensitive optoelectronic device, that being in order to improve the external quantum efficiencies and/or photosensitivities in selected spectral regions (*see* specification, page 15, lines 6-21), and it is respectfully submitted that the Examiner is improperly relying upon Applicants' specification for this teaching. Thus, Applicants respectfully submit that the rejection of claims 29, 30, 32-34 and 54-63 under 35 U.S.C. § 103(a) has been overcome and should therefore be withdrawn.

In addition, claims 57-63 should be allowed for the following additional reasons. As explained in the previous Amendment dated July 26, 2000, claim 57 is an independent claim corresponding to previous claims 25 and 26, with claims 58-63 each depending directly or indirectly from claim 57. As the Examiner stated in section seven of



the Office Action mailed October 23, 2000, previous claims 25 and 26 had not been rejected as unpatentable over Suzuki et al. because the Examiner had interpreted them as being drawn to a device having two, and only two, photoconductive organic layers between two transparent electrodes; however, claim 57 was rejected over Suzuki et al. in view of Sariciftci et al. because it employs open claim language thereby not excluding more photoconductive layers than the explicitly recited "pair of photoconductive organic layers." Claim 57 has been herein amended to recite the limitation of "only one pair of photoconductive organic layers," thereby excluding additional photoconductive layers. Thus, Applicants respectfully submit that the rejection of claims 57-63 under 35 U.S.C. § 103(a) has been overcome and should therefore be withdrawn.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current Amendment. The attached page is captioned **"Version with markings to show changes made."**

In view of the foregoing Amendment and Remarks, Applicants respectfully submit that all of the pending claims of the subject application are now in condition for allowance. Prompt reconsideration and allowance of the present application are therefore earnestly solicited.

Respectfully submitted,
KENYON & KENYON

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By: 

Kevin T. Godlewski
(Reg. No. 47,598)

One Broadway
New York, N.Y. 10004
(212) 425-7200 (telephone)
(212) 425-5288 (facsimile)

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Paragraph beginning at line 31 of page 41 has been amended as follows:

In fabricating practical organic photosensitive optoelectronic devices, in addition to determining the optimal number of and thickness of layers to have in a stacked photosensitive optoelectronic device as discussed above, the area and arrangement of individual cells may be chosen to optimize efficiency and cost. Since the transparent electrodes that are to be used in these devices do have some residual absorption, it is preferable to keep such electrodes thin to minimize this absorption. In addition, keeping the electrode layers as thin as practicable minimizes fabrication time. On the other hand, as all electrode materials are made thinner, their sheet resistance increases. Therefore, it is preferable to minimize the distance which charge carriers must travel in the electrode after collection. A configuration which maximizes photosensitive optoelectronic receptive area and accomplishes this goal is one in which the devices are laid out in long strips on the substrate with electrical connection made to the devices electrodes along the longer sides. U.S. Patent Application Serial No. ~~04/976,666~~ 08/976,666 to Forrest et al. (hereinafter Forrest Appl. '666), which is incorporated herein by reference in its entirety, describes techniques for fabrication of practical organic thin film devices.

In the Claims:

Claims 29, 31 and 57 have been amended as follows:

29. (twice amended) An organic photosensitive optoelectronic device comprising:
- a substrate having a first major surface and a second major surface;
 - two transparent metal substitute electrode layers in superposed relationship



upon said first major surface of said substrate; and

four photoconductive organic layers, having an inner pair and an outer pair,
disposed between said two transparent metal substitute electrode layers.

31. (twice amended) An organic photosensitive optoelectronic device comprising:

a substrate having a first major surface and a second major surface;

two transparent metal substitute electrode layers in superposed relationship
upon said first major surface of said substrate; and

four photoconductive organic layers, having an inner pair and an outer pair,
disposed between said two transparent metal substitute electrode layers, wherein said inner
pair of said four photoconductive organic layers consists of a pair of photoconductive organic
layers selected to form a photovoltaic heterojunction and selected to have spectral sensitivity
in a specified region of the electromagnetic spectrum, and

~~The device of claim 30~~ wherein said inner pair of said four photoconductive organic layers
comprises aluminum *tris*(8-hydroxyquinoline) and 4,4'-bis[N-(1-naphthyl)-N-phenyl-
amino]biphenyl.

57. (amended) An organic photosensitive optoelectronic device comprising:

a substrate having a first major surface and a second major surface;

two transparent electrode layers in superposed relationship upon said first
major surface of said substrate; and

only one a pair of photoconductive organic layers selected to form a
photovoltaic heterojunction disposed between said two electrode layers,

wherein the only one pair of photoconductive organic layers is selected from
the group consisting of a copper phthalocyanine layer with a perylenetetracarboxylic
dianhydride layer, and a copper phthalocyanine layer with a 3,4,9,10-perylenetetracarboxylic-
bis-benzimidazole layer.